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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/656,098	09/04/2003	Hiroshi Kita	990788D2/HG	9919

1933 7590 09/01/2005

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EXAMINER
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YAMNITZKY, MARIE ROSE

ART UNIT	PAPER NUMBER
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1774

DATE MAILED: 09/01/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/656,098

Applicant(s)

KITA ET AL

Examiner

Marie R. Yamnitzky

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 04 September 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-13 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-13 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☒ Certified copies of the priority documents have been received in Application No. 09/466,949.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>rec'd 04 Sep 2003</u> . | 6) <input type="checkbox"/> Other: _____  |

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1. Claims 1-13 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In each of the independent claims, each of  $L_{11}$ ,  $L_{12}$  and  $L_{13}$  is defined as a "group of atoms" necessary to form an aromatic heterocyclic ring. The independent claims further set forth a proviso that at least one of  $L_{11}$ ,  $L_{12}$  and  $L_{13}$  is  $=N-$ ,  $-N(R_{41})-$ ,  $-S-$  or  $-O-$ . Of the possibilities set forth in the proviso, only  $-N(R_{41})-$  provides a "group of atoms". The apparent conflict between the terminology of "group of atoms" and possibilities for the proviso confuses the scope of the L variables.

It is also not clear if the terminology "group of atoms" provides for heterocyclic groups having more than five members in the ring, such as if one or two of the L variables were  $-CH=CH-$ .

The third line from the end of each of the independent claims includes the phrase "or a group making the biaryl group". The use of the term "making" is confusing. It is not clear if "making" is to be interpreted as "comprising".

The scope of compounds of formula B1 is also not clear in light of the examples set forth in the specification. Of the examples set forth on pages 42-44, B-11 on page 43 and B-22 on page 44 do not meet all of the limitations of formula B1 because each of these compounds comprises only one of  $Ar_{41}$  and  $Ar_{42}$  as defined in the claims and earlier in the specification, unless the claim terminology has other than conventional meanings.

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2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 1 and 13 are rejected under 35 U.S.C. 102(b) as being anticipated by Inoue et al. (US 5,635,308).

Interpreting the term “making” as meaning “comprising”, Compound No. VII-21 as defined in columns 19-20 of the Inoue patent meets the limitations of an electroluminescent material represented by formula B1. Inoue’s Compound No. VII-21 is disclosed for use in an electroluminescent element comprising an anode and a cathode.

Inoue’s Compound No. VII-21 is a compound of present formula B1 in which each of  $L_{11}$  and  $L_{12}$  is =N-,  $L_{13}$  is -O-, each of  $Ar_{41}$  and  $Ar_{42}$  is an aryl group, and one of  $Ar_{41}$  and  $Ar_{42}$  comprises a biaryl group having a bond capable of giving an internal rotational isomerism (specifically, comprising the biaryl group represented by the sixth formula on page 25 of the present specification).

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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5. Claims 1 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Inoue et al. (US 5,635,308) as applied to claims 1 and 13 under 35 U.S.C. 102(b) and for the further reasons set forth below.

Inoue et al. disclose one specific compound meeting the limitations of the compound of present formula B1, and suggests others.

Inoue's Compound No. VII-21 is a specific example of a compound of Inoue's compound of formula (3) as defined in columns 7-8 (see c. 5 for the referenced definitions of R<sub>1</sub> and R<sub>2</sub> in formula (2)). Compound No. VII-21 is a compound of formula (3) in which each of R<sub>3</sub> and R<sub>4</sub> is an oxadiazolyl group substituted with a phenyl group. Inoue et al. teach that other heterocyclic groups substituted with a phenyl group may be used in place of an oxadiazolyl group substituted with a phenyl group. In particular, see c. 5, l. 55-59.

It would have been *prima facie* obvious to one of ordinary skill in the art at the time of the invention to make compounds similar to the specific compounds disclosed by Inoue et al. with the expectation that compounds similar in structure will have similar properties and can be used for the same purpose. For example, based on Inoue's teachings at c. 5, l. 55-59, one of ordinary skill in the art at the time of the invention would have reasonably expected that substituting a thienyl or furyl group for one or both of the oxadiazolyl groups in Compound No. VII-21 would provide other compounds having properties similar to the properties of Compound No. VII-21 and usable for the same purpose. (Substituting a phenyl group for the methyl group on both of the thienyl groups in Compound No. VII-22 also provides the same compound as

substituting a thienyl group for each of the oxadiazole groups in Compound No. VII-21, and is suggested by the teachings at c. 5, l. 55-59.)

6. Claims 2-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tanaka (US 5,717,289) in view of Inoue et al. (US 5,635,308).

Tanaka discloses an electroluminescent element comprising an electroluminescent layer and a color changing layer. The electroluminescent layer is formed of an organic compound that emits blue light. The color changing layer comprises two inorganic fluorescent substances such as zinc sulfide doped with copper and zinc sulfide doped with manganese. One of the inorganic fluorescent substances is capable of converting blue light to green light, and the other is capable of converting green light to red light. For example, see column 3, line 20-c. 4, l. 36. Tanaka et al. suggest some compounds that may be used as the organic compound, but do not explicitly disclose compounds meeting the limitations of a compound represented by present formula B1.

Inoue et al. disclose a compound represented by present formula B1 (Inoue's Compound No. VII-21 as defined in c. 19-20) and suggest others (such as compounds having a thienyl or furyl group in place of one or both of the oxadiazolyl groups of Compound No. VII-21). Inoue's compounds are disclosed as capable of emitting blue light when used as electroluminescent compounds in an electroluminescent device (e.g. see c. 43, l. 1-15).

It would have been *prima facie* obvious to one of ordinary skill in the art at the time of the invention to make a device according to Tanaka utilizing various known organic compounds capable of emitting blue light. Given that Tanaka's purpose is to convert color emitted from one

component to another color so as to influence the color of light emitted from the device as a whole, it would have been within the level of ordinary skill of a worker in the art at the time of the invention, as a matter of routine experimentation, to select an organic compound capable of emitting blue light of a wavelength capable of being absorbed by at least the inorganic fluorescent substance that converts blue light to green light so as to obtain the results taught by Tanaka. One of ordinary skill in the art would have reasonably expected that Inoue's compounds that emit blue light could be used as the compound emitting blue light in Tanaka's device. In particular, one of ordinary skill in the art would have reasonably expected that at least Inoue's oxadiazole-containing compound VII-21 could be used in Tanaka's device since Tanaka teaches that derivatives of oxadiazole are suitable for the device (e.g. see c. 3, l. 62).

Regarding present claim 3's recitation "prepared by a Sol-Gel method", this is a process limitation in a product claim. Product-by-process claims are not limited to the method steps recited, only to the structure implied by the steps. In the present case, it is the examiner's position that the structure implied by the steps is particles (i.e. the inorganic fluorescent substance is provided in the form of particles made by a sol-gel method). Tanaka teaches dispersing the two inorganic fluorescent substances into an organic binder in order to form the color changing layer. Tanaka does not explicitly disclose that either of the inorganic fluorescent substances is prepared by a sol-gel method as required by present claim 3, but the teaching of "dispersing" implies that the inorganic fluorescent substances are in the form of particles.

With respect to present claim 4, at least Tanaka's inorganic fluorescent substance capable of converting blue light to green light will have a peak emission wavelength within the specified range since the claimed range fully encompasses the wavelengths of green light.

The ranges set forth in present claims 4 and 5 overlap the range of wavelengths of red light. It is reasonable to expect that Tanaka's inorganic fluorescent substance capable of converting green light to red light will provide a peak emission wavelength within the range of claims 4 and 5, or will provide a peak emission wavelength sufficiently close to the upper end of the specified ranges that one of ordinary skill in the art would reasonably expect the resultant device to have similar properties. In the alternative, it would have been an obvious modification to one of ordinary skill in the art at the time of the invention to select inorganic fluorescent substances capable of converting green light to red light, other than the specific substance taught by Tanaka, and to select such substances having a peak emission wavelength within the region of red light suitable of obtaining the results taught by Tanaka.

The ranges set forth in present claims 6 and 7 overlap the range of wavelengths of blue light. It is reasonable to expect Inoue's Compound No. VII-21 and similar compounds will provide a peak emission wavelength within the range of claims 6 and 7, or will provide a peak emission wavelength sufficiently close to the upper end of the specified ranges that one of ordinary skill in the art would reasonably expect the resultant device to have similar properties.

7. Claims 8-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Inoue et al. (US 5,635,308) in view of JP 10-025472.



Inoue et al. disclose a compound represented by present formula B1 (Inoue's Compound No. VII-21 as defined in c. 19-20) and suggest others (such as compounds having a thienyl or furyl group in place of one or both of the oxadiazolyl groups of Compound No. VII-21). Inoue's compounds are disclosed as capable of emitting blue light when used as electroluminescent compounds in an electroluminescent device (e.g. see c. 43, l. 1-15). Inoue et al. teach that other luminescent materials may be used in combination with Inoue's compounds so as to shift the color of light emitted to a longer wavelength, but do not explicitly disclose using a rare earth metal complex fluorescent substance (e.g. see c. 30, l. 60-c. 31, l. 3).

The use of a rare earth metal complex as a wavelength conversion material was known in the art at the time of the invention as demonstrated by JP 10-025472. JP 10-025472 discloses an electroluminescent element comprising an organic electroluminescent material that emits blue light and teaches that the material may be combined with a rare earth complex such as an europium complex, the europium complex providing wavelength conversion. For example, see Fig. 2-4 in the Japanese language document, and see paragraphs [0034], [0035], [0044] and [0052] in the machine-assisted translation.

It would have been an obvious modification to one of ordinary skill in the art at the time of the invention to include a wavelength conversion material such as a rare earth metal complex in a device according to Inoue et al. One of ordinary skill in the art would have been motivated to do so where it is desirable to provide a device having multicolored light emission or a shift in color of light emission as taught in JP 10-025472.

Given that JP 10-025473 teaches that the color of almost all visible regions can be covered by utilizing materials providing wavelength conversion, it would have been within the level of ordinary skill of a worker in the art at the time of the invention to select particular combinations of organic electroluminescent materials and rare earth metal complex fluorescent substances based on the light-emitting and light-absorbing capabilities of the different materials/substances, and the capability of a particular combination to provide one or more desired colors of emitted light for the resultant device.

The ranges set forth in present claims 9 and 10 overlap the range of wavelengths of red light. JP 10-25472 does not explicitly disclose the use of an europium complex having a peak emission wavelength within the ranges of claims 9 and 10, but europium complexes emit red light. It is reasonable to expect that an europium complex as taught by the prior art will provide a peak emission wavelength within the ranges of claims 9 and 10, or will provide a peak emission wavelength sufficiently close to the upper end of the specified ranges that one of ordinary skill in the art would reasonably expect the resultant device to have similar properties. In the alternative, it would have been an obvious modification to one of ordinary skill in the art at the time of the invention to select a particular europium complex to provide a desired peak wavelength within the range of visible light.

The ranges set forth in present claims 11 and 12 overlap the range of wavelengths of blue light. It is reasonable to expect Inoue's Compound No. VII-21 and similar compounds will provide a peak emission wavelength within the range of claims 6 and 7, or will provide a peak

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emission wavelength sufficiently close to the upper end of the specified ranges that one of ordinary skill in the art would reasonably expect the resultant device to have similar properties.

8. Any inquiry concerning this communication should be directed to Marie R. Yamnitzky at telephone number (571) 272-1531. The examiner works a flexible schedule but can generally be reached at this number from 6:30 a.m. to 4:00 p.m. Monday, Tuesday, Thursday and Friday, and every other Wednesday from 6:30 a.m. to 3:00 p.m.

The current fax number for all official faxes is (571) 273-8300. (Unofficial faxes to be sent directly to examiner Yamnitzky can be sent to (571) 273-1531.)

MRY  
August 29, 2005



**MARIE YAMNITZKY  
PRIMARY EXAMINER**

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